

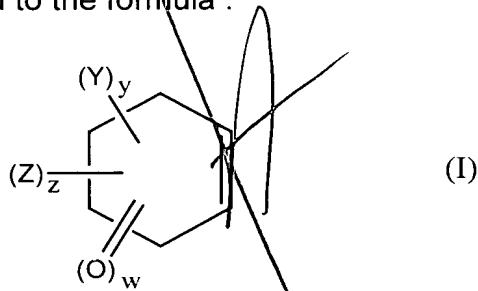
CLAIMS

1. Method for obtaining a photochromic latex comprising a polymerization in aqueous emulsion of an initial polymerizable mixture comprising one or more organic monomers containing C=C groups which are polymerizable by free-radical mechanism and one or more photochromic compounds until a final latex is obtained, characterized in that it comprises the addition to the initial polymerizable mixture, during the polymerization of the initial polymerizable mixture or to the final latex of an effective quantity of at least one agent for stabilizing the photochromic properties selected from compounds of cyclopentene, cyclohexene, cycloheptene, cyclooctene and compounds containing an ethylenic unsaturation not forming part of an aromatic ring and which contain, in the  $\alpha$  position with respect to the ethylenic unsaturation, a carbon atom bearing a free hydroxy group.

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2. Method according to claim 1, characterized in that the stabilization agent is a compound of cyclohexene.

20 3. Method according to claim 2, characterized in that the cyclohexene compounds correspond to the formula :



in which each Y is independently an alkyl group of 1 to 4 carbon atoms, Z is a hydroxy group, a 2-oxoethyl group, a hydroxalkyl group of 1 to 3 carbon atoms, an alkoxy carbonyl group of 2 to 5 carbon atoms, or a R'COOR" group in which R' is an alkyl radical of 1 to 4 carbon atoms and R" is an alkane di-yl radical of 2 to 4 carbon atoms or an alkylidene radical of 1 to 5 carbon atoms, y is an integer from 0 to 3, z represents 0 or 1, w represents 0 or 1, and the sum of z and w is 0 or 1.

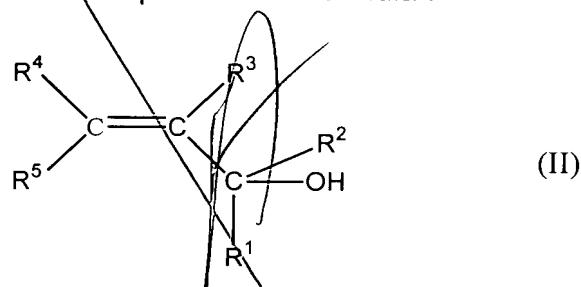
4. Method according to claim 3, characterized in that the cyclohexene

compounds are selected from cyclohexene,  $\alpha$ -terpineol, terpinen-4-ol,  $\alpha$ -terpinyl acetate,  $\alpha$ -terpinyl propionate,  $\alpha$ -terpinyl butyrate, 1-methyl-1-cyclohexene, 3-methyl-1-cyclohexene, 4-methyl-1-cyclohexene, methyl 1-cyclohexene-1-carboxylate, 3-methyl-2-cyclohexen-1-ol, 3-methyl-2-cyclohexen-1-one, 4-isopropyl-2-cyclohexen-1-one, 3,5-dimethyl-2-cyclohexen-1-one, 4,4-dimethyl-2-cyclohexen-1-one, isophorone, 2,6,6-trimethyl-1-cyclohexene-1-acetaldehyde, and 3,5,5-trimethyl-2-cyclohexen-1-ol.

5 5. Method according to claim 3, characterized in that the cyclohexene  
10 compound is cyclohexene.

15 6. Method according to claim 1, characterized in that the carbon in the  $\alpha$  position of the compound with ethylenic unsaturation is bonded to at least one hydrogen atom.

15 7. Method according to claim 6, characterized in that the compounds with ethylenic unsaturation correspond to the formula :



20 in which R<sup>1</sup> and R<sup>2</sup> represent hydrogen or one of the R<sup>1</sup> and R<sup>2</sup> groups represents hydrogen, while the other forms, with the R<sup>5</sup> group, a C<sub>5</sub>-C<sub>10</sub> ring which may be substituted with one or more linear or branched C<sub>1</sub>-C<sub>4</sub> alkyl groups or one or more C<sub>2</sub>-C<sub>4</sub> alkylene groups ; or one of the R<sup>1</sup>, R<sup>2</sup> groups may represent hydrogen, while the other represents a C<sub>1</sub>-C<sub>6</sub> aliphatic alkyl group, a C<sub>4</sub>-C<sub>16</sub> cyclic hydrocarbon group or a C<sub>6</sub>-C<sub>16</sub> aromatic hydrocarbon group ;

25 R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> independently represent hydrogen or a C<sub>1</sub>-C<sub>6</sub> alkyl group which may be substituted with one or more OH groups and in which the chain may be interrupted by one or more ether, ester or ketone groups ; a C<sub>6</sub>-C<sub>16</sub> aromatic hydrocarbon group or a C<sub>4</sub>-C<sub>16</sub> cyclic hydrocarbon group ; R<sup>5</sup> may form, with one of the R<sup>1</sup> or R<sup>2</sup> groups, a C<sub>5</sub>-C<sub>10</sub> ring which may be substituted with one or more linear or branched C<sub>1</sub>-C<sub>4</sub> alkyl groups or one or more C<sub>2</sub>-C<sub>4</sub>

alkylene groups ;

R<sup>3</sup> and R<sup>4</sup> may form a C<sub>5</sub>-C<sub>10</sub> ring which may be substituted with one or more C<sub>1</sub>-C<sub>4</sub> alkyl groups or C<sub>2</sub>-C<sub>4</sub> alkylene groups ;

5 Two or more carbon atoms of the C<sub>5</sub>-C<sub>10</sub> ring formed with R<sup>1</sup> or R<sup>2</sup> and R<sup>5</sup> or with R<sup>3</sup> and R<sup>4</sup> may be bonded by a hydrocarbon bridge.

10 8. Method according to claim 7, characterized in that R<sup>1</sup> and R<sup>2</sup> represent hydrogen, R<sup>3</sup> represents a methyl group, R<sup>4</sup> represents hydrogen or a methyl group and R<sup>5</sup> represents hydrogen, a methyl, ethyl or CH<sub>2</sub>OH group.

15 9. Method according to claim 7, characterized in that the compound of formula (II) is selected from the group composed of allyl alcohol, methallyl alcohol, crotyl alcohol, 2-cyclohexen-1-ol, trans-2-hexen-1-ol, cis-2-butene-1,4-diol, 3-methyl-2-buten-1-ol, trans-2-methyl-3-phenyl-2-propen-1-ol, 3-buten-2-ol, carveol, myrtenol, verbenol and trans-cinnamyl alcohol.

20 10. Method according to claim 9, characterized in that the compound of formula (II) is 3-methyl-2-buten-1-ol.

25 11. Method according to any of the preceding claims, characterized in that the quantity of photochromic property stabilization agent added represents 0.1 to 10% by weight, preferably 1 to 10% by weight and more preferably about 5% by weight compared to the weight of monomers in the initial mixture.

30 12. Method according to any of the preceding claims, characterized in that the aqueous emulsion of the initial polymerizable mixture is a mini-emulsion.

35 13. Method according to any of the preceding claims, characterized in that the monomers polymerizable by free-radical mechanism are selected from the alkyl acrylates, the alkyl methacrylates and their mixtures.

14. Method according to any of the preceding claims, characterized in that the photochromic compound is selected from the chromenes, the spirooxazines and their mixtures.

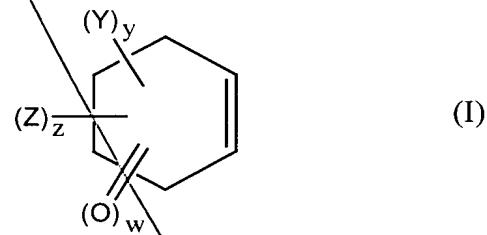
15. Method according to any of the preceding claims, characterized in that the photochemical property stabilization agent is added to the initial polymerizable mixture.

5        16. Stabilized photochromic latex comprising an aqueous dispersion of polymer particles resulting from the free-radical polymerization of one or more organic monomers containing C=C groups and one or more photochromic compounds, characterized in that it contains an effective quantity of at least one agent for stabilizing the photochromic properties selected from compounds of

10 cyclopentene, cyclohexene, cycloheptene, cyclooctene and compounds containing an ethylenic unsaturation not forming part of an aromatic ring and which contain, in the  $\alpha$  position with respect to the ethylenic unsaturation, a carbon atom bearing a free hydroxy group.

15        17. Latex according to claim 16, characterized in that the stabilization agent is a compound of cyclohexene.

20        18. Latex according to claim 17, characterized in that the cyclohexene compounds correspond to the formula :



in which each Y is independently an alkyl group of 1 to 4 carbon atoms, Z is a hydroxy group, a 2-oxoethyl group, a hydroxyalkyl group of 1 to 3 carbon atoms, 25 an alkoxy carbonyl group of 2 to 5 carbon atoms, or a R'COOR" group in which R' is an alkyl radical of 1 to 4 carbon atoms and R" is an alkane di-yl radical of 2 to 4 carbon atoms or an alkylidene radical of 1 to 5 carbon atoms, y is an integer from 0 to 3, z represents 0 or 1, w represents 0 or 1, and the sum of z and w is 0 or 1.

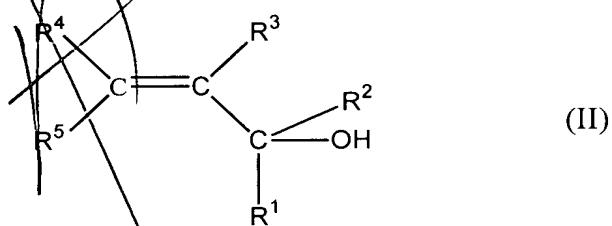
30        19. Latex according to claim 18, characterized in that the cyclohexene compounds are selected from cyclohexene,  $\alpha$ -terpineol, terpinen-4-ol,  $\alpha$ -terpinyl

acetate,  $\alpha$ -terpinyl propionate,  $\alpha$ -terpinyl butyrate, 1-methyl-1-cyclohexene, 3-methyl-1-cyclohexene, 4-methyl-1-cyclohexene, methyl 1-cyclohexene-1-carboxylate, 3-methyl-2-cyclohexen-1-ol, 3-methyl-2-cyclohexen-1-one, 4-isopropyl-2-cyclohexen-1-one, 3,5-dimethyl-2-cyclohexen-1-one, 4,4-dimethyl-2-cyclohexen-1-one, isophorone, 2,6,6-trimethyl-1-cyclohexene-1-acetaldehyde, and 3,5,5-trimethyl-2-cyclohexen-1-ol.

20. Latex according to claim 18, characterized in that the cyclohexene compound is cyclohexene.

21. Latex according to claim 17, characterized in that the carbon in the  $\alpha$  position of the compound with ethylenic unsaturation is bonded to at least one hydrogen atom.

22. Latex according to claim 17, characterized in that the compounds with ethylenic unsaturation correspond to the formula :



20. in which  $R^1$  and  $R^2$  represent hydrogen or one of the  $R^1$  and  $R^2$  groups represents hydrogen, while the other forms, with the  $R^5$  group, a  $C_5-C_{10}$  ring which may be substituted with one or more linear or branched  $C_1-C_4$  alkyl groups or one or more  $C_2-C_4$  alkylene groups ; or one of the  $R^1$ ,  $R^2$  groups may represent hydrogen, while the other represents a  $C_1-C_6$  aliphatic alkyl group, a  $C_4-C_{16}$  cyclic hydrocarbon group or a  $C_6-C_{16}$  aromatic hydrocarbon group ;

25.  $R^3$ ,  $R^4$  and  $R^5$  independently represent hydrogen or a  $C_1-C_6$  alkyl group which may be substituted with one or more OH groups and in which the chain may be interrupted by one or more ether, ester or ketone groups ; a  $C_6-C_{16}$  aromatic hydrocarbon group or a  $C_4-C_{16}$  cyclic hydrocarbon group ;  $R^5$  may form, with one of the  $R^1$  or  $R^2$  groups, a  $C_5-C_{10}$  ring which may be substituted with one or more linear or branched  $C_1-C_4$  alkyl groups or one or more  $C_2-C_4$  alkylene groups ;

R<sup>3</sup> and R<sup>4</sup> may form a C<sub>5</sub>-C<sub>10</sub> ring which may be substituted with one or more C<sub>1</sub>-C<sub>4</sub> alkyl groups or C<sub>2</sub>-C<sub>4</sub> alkylene groups ;

Two or more carbon atoms of the C<sub>5</sub>-C<sub>10</sub> ring formed with R<sup>1</sup> or R<sup>2</sup> and R<sup>5</sup> or with R<sup>3</sup> and R<sup>4</sup> may be bonded by a hydrocarbon bridge.

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23. Latex according to claim 22, characterized in that R<sup>1</sup> and R<sup>2</sup> represent hydrogen, R<sup>3</sup> represents a methyl group, R<sup>4</sup> represents hydrogen or a methyl group and R<sup>5</sup> represents hydrogen, a methyl, ethyl or CH<sub>2</sub>OH group.

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24. Latex according to claim 22, characterized in that the compound of formula (II) is selected from the group composed of allyl alcohol, methallyl alcohol, crotyl alcohol, 2-cyclohexen-1-ol, trans-2-hexen-1-ol, cis-2-butene-1,4-diol, 3-methyl-2-buten-1-ol, trans-2-methyl-3-phenyl-2-propen-1-ol, 3-buten-2-ol, carveol, myrtenol, verbenol and trans-cinnamyl alcohol.

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25. Latex according to claim 24, characterized in that the compound of formula (II) is 3-methyl-2-buten-1-ol.

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26. Latex according to any of claims 16 to 25, characterized in that the quantity of photochromic property stabilization agent present in the latex represents 0.1 to 10% by weight, preferably 1 to 10% by weight and more preferably about 5% by weight compared to the weight of monomers in the initial mixture.

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27. Latex according to any of claims 16 to 26, characterized in that the polymer is an alkyl polyacrylate, an alkyl polymethacrylate or a copolymer of alkyl acrylate and alkyl methacrylate.

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28. Latex according to any of claims 16 to 27, characterized in that the photochromic compound is selected from the chromenes, the spirooxazines and their mixtures.

29. Substrate coated with a film formed by drying a latex according to any of claims 16 to 28.

30. Substrate according to claim 29, characterized in that consists of an ophthalmic lens.

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